Neighborhood Planning for Community Revitalization

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Diamond Lake:
An Analysis of An Urban Wetland and Projections for the Future

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Diamond Lake:
An Analysis of An Urban Wetland and Projections for the Future

Conducted on behalf of Hale, Page, and Diamond Lake Community Association

Prepared by
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January 1998

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A report prepared for the Hale, Page, Diamond Lake Neighborhood Environmental Committee.

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A. Abstract

Diamond Lake is located in southwestern Minneapolis, surrounded by the Hale, Page, and Diamond Lake Neighborhoods. It is a 58 acre, type 5 wetland (Appendix A), encompassed by residential development. Since the 1920's, Diamond Lake has been the subject of many changes, the majority of them human induced. These changes have altered this wetland in ways that have permanently transformed its purpose and management.

Previously, wetlands were misunderstood as undevelopable lands that were not good for much more than dumping garbage. At this time, many residents were becoming more and more concerned with the health and future of their neighborhood wetland.

During the more recent past, significantly more studies and surveys have been completed for Diamond Lake. The Minnesota Department of Natural Resources, Minneapolis Park and Recreation Board, Minnesota Pollution Control Agency and Minnehaha Creek Watershed District have all completed many water quality tests and lake surveys.

Future changes threaten to alter the state of this wetland again. The proposed re-construction of I-35W brings new questions and concerns to the residents of the Hale, Page, and Diamond Lake Neighborhoods.

This report will review the history of Diamond Lake to show how this wetland has been influenced and explain the condition of the wetland today. This report also discusses water quality results, future changes, and possible management strategies.

B. Introduction

"I am I plus my surroundings and if I do not preserve the latter, I do not preserve myself."

José Ortega y Gasset (1883–1955), Spanish essayist, philosopher. *Meditations on Quixote,* "To the Reader" (1914).

The above quote is a reflection of the belief that if we do not take care of our environment, we are not taking care of ourselves and, in turn, our future generations. The Hale, Page, and Diamond Lake Community Association (HPDL) wanted, "to better educate the community about the use of wetlands, and about our responsibility, as individuals and a community, to nurture the health and wellness of our surroundings to ensure the viability of them"(Proposal form). Residents wanted to know the primary factors that have influenced Diamond Lake, an urban wetland in south Minneapolis. These factors include:

- wetland standards and legislation
- past management practices
- surrounding development

This report is a compilation of a majority of the information on Diamond Lake's background. The present condition, an interpretation of its status and projections for the future will be discussed. The community will be able to use this report as a tool to improve and ensure the health and enjoyment of the wetland for the future. Other neighborhoods may also be able to use this information as an example for future changes to their community wetlands and lakes.

C. History

The Minneapolis Chain of Lakes was formed by glacial ice blocks left in a former and now buried valley of the Mississippi River (Karen Kuchera)(See Figure 1). Geologically, Diamond Lake is centered between these lakes, however, is not considered part of the "Chain of Lakes". During August of 1853, surveyors for the U.S. Geological Land Survey noted that "This township contains a number of lakes of clear, deep water; also a great number of small ones, there are also a considerable number of marshes generally suitable for meadows", and "at least four fifths of this land is claimed and one half at least is settled on." The original vegetation was noted as oak woodland in the uplands and low wetlands that were frequently identified as tamarack bog vegetation. Some of this was converted to agriculture crops such as apples, plums, and cranberries. At this time, Diamond Lake was much larger than it is now. It was identified as two lakes; Pearl Lake was connected to the north shore of Diamond Lake by a small waterway and is now where Pearl Park is located. There was also an arm attached to the east side of Diamond Lake that is now where George - Todd Park is located. Pearl and Diamond were also connected to Minnehaha Creek by a wetland (See Figure 2). Plat maps show the water bodies remain fairly undisturbed though 1913, with the only changes being increased population and a road built between Diamond and Pearl, which appears in maps as early as 1873 (See figures 3,4, and 5). However, U.S. Geological Survey maps show that by 1916 all of Pearl Lake and most of the east arm of Diamond Lake had become marsh (See Figure 6). During dry years, Diamond Lake was also known to dry up and become marsh.

During the 1920's through the 1950's the area converted from agriculture to mainly residential and the Minneapolis Park and Recreation Board (MPRB) began it's pursuit to acquire and develop a park for the community. Before the Board acquired any land to develop, extensive plans were designed for a large park surrounding Diamond Lake that included several playing fields, walking paths, and accessibility to the water body from all sides (See Figure 7). These plans changed several times as lands were bought up for private residences before the Board acquired them. According to correspondence from the MPRB to a resident of Diamond Lake and MPRB annual, reports this is how the Board came to acquire Pearl and Diamond Lake:

1926 - The first acquisition of 17 acres of land was made.

1936- 72 acres was acquired in the 58th Street area.

Figure 1: Map of Now Buried Former Channel of the Mississippi River

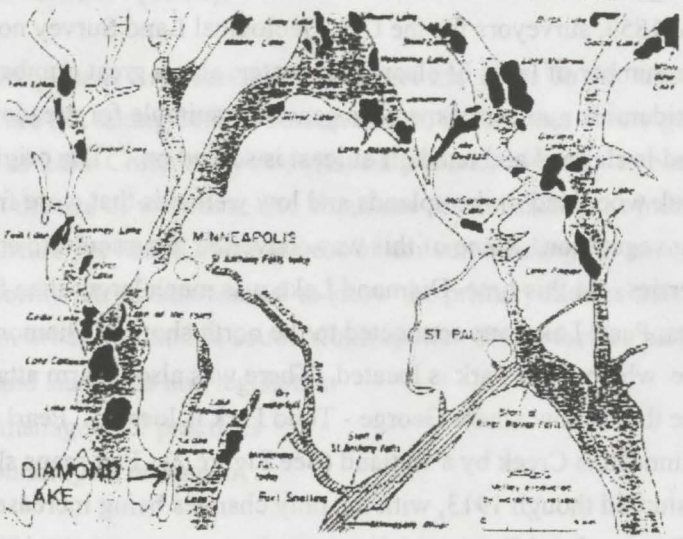
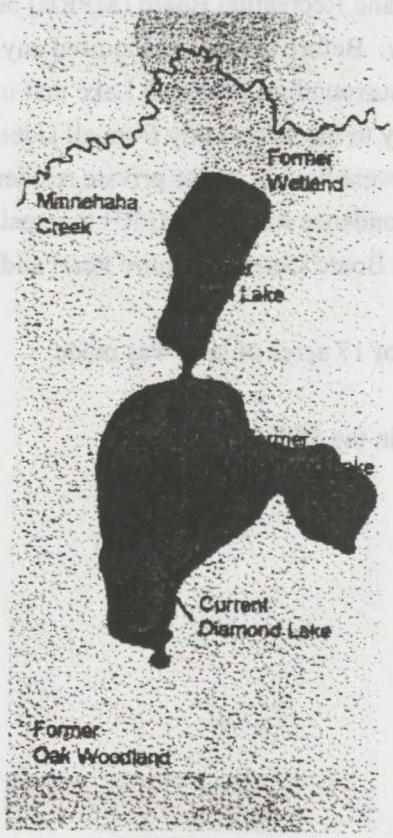


Figure 2: Diagram of Wetland Connecting Minnehaha Creek with Pearl Lake



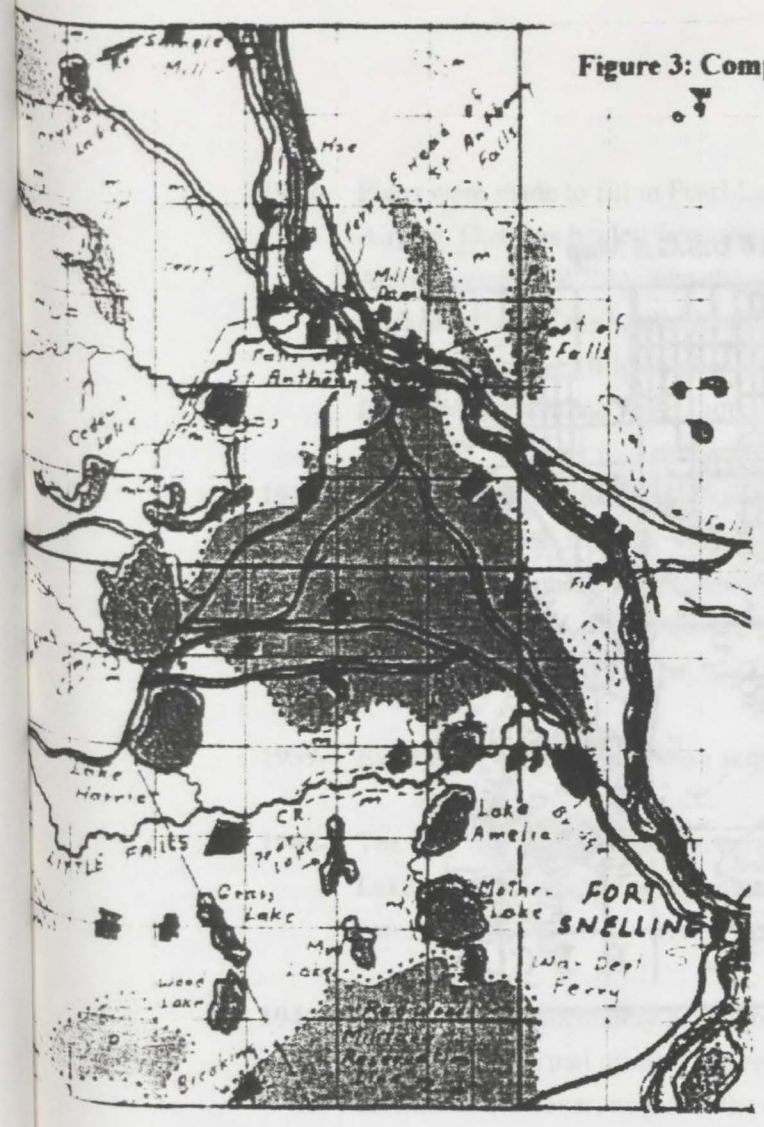


Figure 3: Composite Map of U.S. Surveyors' Original Plats, 1853

Figure 4: Hennepin County Plat Map, 1873

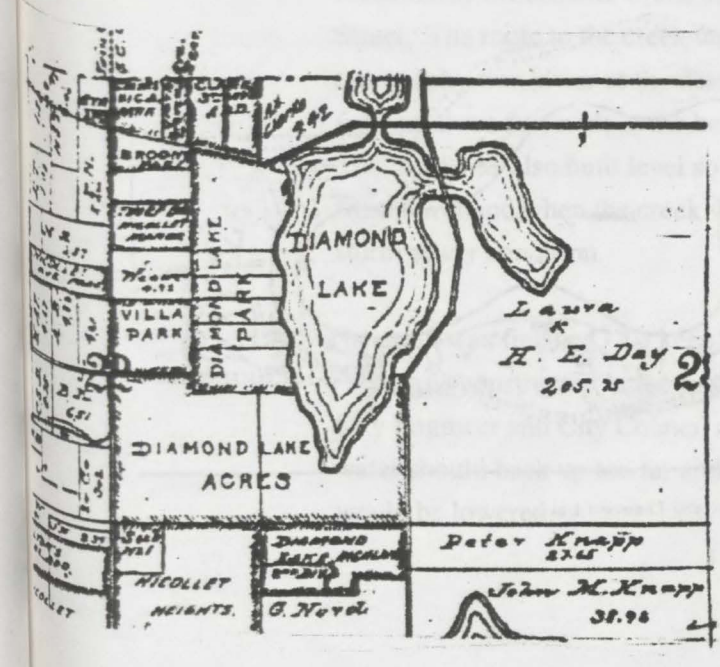


Figure 6: 1916 U.S.G.S Map

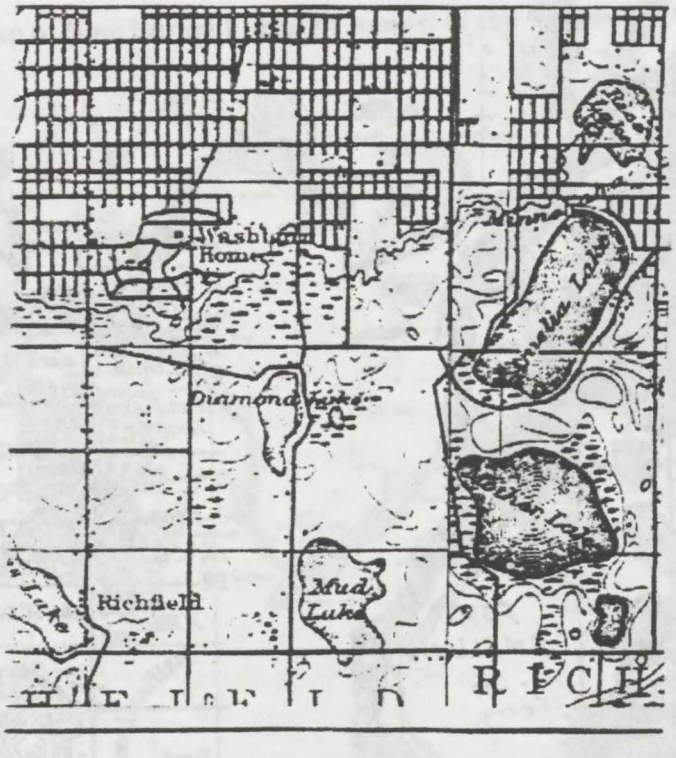
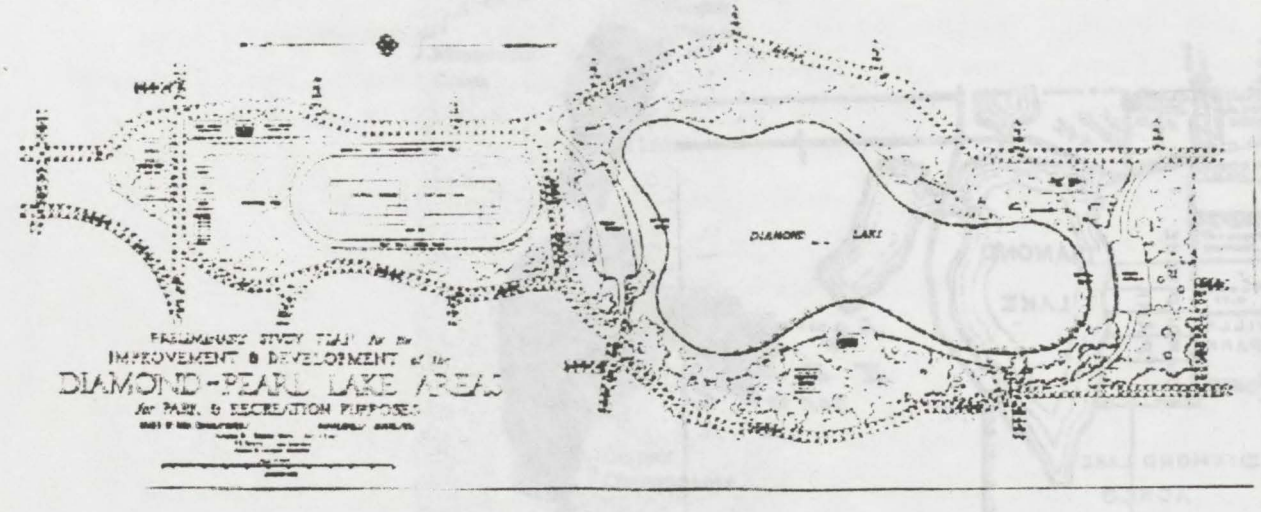


Figure 7: Plan for Improvement of Pearl and Diamond Lake, 1926



Plan for the Improvement of Pearl and Diamond Lakes

1937- Plans were made to fill in Pearl Lake with surplus dirt from the Municipal Airport. Dirt was hauled from the Airport by the Works Project Administration (WPA), then about one foot of top soil was stripped from the surface of bed of the basin, the surplus dirt was laid and covered with the topsoil. The south end was filled higher for a playing field. During this time Diamond Lake had no standing water, but was filled with cattail marsh and bulrushes.

1938- A drain was laid from Pearl Park to Diamond Lake. During wet years, Pearl Park would often fill with water. At approximately this time, the Board acquired the property bounded by Diamond Lake Road southward to 59th Street, Portland Avenue westward, 58th Street on the south and on the line, more or less paralleling, Clinton Avenue.

1939- Eight more acres of land were acquired.

1940- The City began to construct several storm drains, which emptied into Diamond Lake. At this time, the wetland became a storm-water storage basin for over 800 acres.

1941- The wetland immediately began to fill with water when the drains were completed. Normal rainfall had resumed and the wetland returned to normal elevation. However, now that the wetland was being fed by the drainage area, it was subject to sudden changes in water levels. An outlet was proposed to keep the elevation from rising too high. This outlet would have to either drain to Lake Nokomis or Minnehaha Creek between the Portland Avenue bridge and 13th Street. The route to the creek was chosen as the destination was closer and the topography was lower at the destination. The drain was built in a semi-circular fashion, three feet wide at the bottom and one-and-a-half feet wide at the top. The drain was also built level so as to drain the water level when it was high or fill the wetland when the creek was high. This drain restored the wetland to pre-storm sewer condition.

1942- The drain was finished. To keep the water level at a stage that pleased residents, a weir was constructed in the first manhole on 54th Street. The top was fixed by a City Engineer and City Council at 111.5 feet with the understanding that if the water should back up too far and cause damage to the storm drains, the weir would be lowered.

1943- Minnehaha Creek flooded and backed up the drain to Diamond Lake, raising water elevation in both Pearl and Diamond Lakes. Dirt was hauled from the Airport to create a dike across Pearl at 52nd Street and stop flooding north of 52nd Street at the request of a resident.

1944- Minnehaha Creek flooded again in the spring. Pearl and Diamond were again raised. The plug in the culvert on 52nd Street dike broke and flooded the north end. To relieve the residents in the northwest corner, the first manhole at the north end of the park and north of 52nd Street were clogged with sandbags. The dike on 52nd was also raised with 50 yards of clay loam. Both of these actions were done at the suggestion of the same resident as earlier. The sandbags were removed when the creek receded.

1948- The area that is now George-Todd Park was officially acquired.

Up to this point, many of the developments that have been taking place were being carried out by the WPA. When World War II began, the WPA program was no longer available to support these developments. This put a halt to many Park Board improvements and changed many plans for the future of the park. However, Diamond Lake was dredged at some point and the fill used to help fill in Pearl Lake, these dates are uncertain.

D. Preliminary Surveys

Little was found concerning Diamond or Pearl Lakes between the late 1940's and the mid-1960's. However, in 1953, the first DNR lake survey was conducted. There had been no prior surveys or investigations other than observations made by residents and water level reports; which had been recorded since 1928. This general survey notes the watershed uses, water levels, physical, chemical, and biological characteristics, classification as type 5 (See Appendix A), and management recommendations. For instance, the color of the water was noted as green as a result of a moderate algae bloom. A chemical analysis shows the quality of the water then:

Table 1: 1953 DNR Water Quality

Water Quality Indicators	Relevance and Description	Measurement
Total alkalinity	A measure of a lake's ability to buffer or neutralize acids - values of less than 5 to 10 mg/L are potentially sensitive to acid rain	97.5(mg/L)
Total phosphorus	Problems of eutrophication are often associated with accelerated loading of phosphorus	.153(mg/L)
Total nitrogen	Can stimulate growth of algae and other aquatic plants which can lead to diminished water clarity and fish production	1.22(mg/L)

On a final note, the survey also states that because of the shallow basin (maximum depths of 4.5 to 5.8 feet) Diamond Lake could not be considered a fish lake, due to winter kill.

E. More Changes

During the mid-1960's, Diamond Lake was, again, the focus of attention. The Department of Transportation (DOT) was constructing Interstate 35W (I-35W) through South Minneapolis and planning on diverting storm water runoff from several miles of the interstate to Diamond Lake. This development had tremendous consequences, not just during the construction phase, but for as long as the interstate would be diverting runoff. Water quality would deteriorate markedly as a result of increased sedimentation, increased water levels, and increased pollutant runoff (salt de-icing, exhaust, particulates, pesticides, heavy metals, etc.). At that time, the DOT was not required to complete a Environmental Impact Statement (EIS) to document the health of the wetland before construction of I-35W and project the impacts drainage from the interstate might have. Therefore, the only documentation of the condition of the wetland before I-35W is the 1953 DNR lake survey.

F. Community Attitudes

Previously, wetlands were misunderstood as undevelopable lands that were not good for much more than dumping garbage. However, at this time, many residents were becoming more and more concerned with the health and future of their neighborhood water body. Many committees and groups were formed to represent the public's point of view. For instance, The Preserve-Diamond-Lake Committee took the position that Diamond Lake should be declared a wildlife sanctuary and Natural Science Preserve. Another group, Park Improvement and Recreation Council, gave voice to those who wanted to develop community programs for the park.. One resident, Marvin Borell, was an avid naturalist and kept detailed notes about the surrounding wildlife and ecology of the wetland (See Appendix C).

G. PRESENT

Today, Diamond Lake is a wetland of 58 acres, surrounded by residential development and urban park land that is owned and maintained by MPRB. The maximum depth is 5.8 feet with an average of 3.2 feet. The current watershed area is an approximate total of 680 acres that is generally bounded by 52nd Street on the north, County Road 62 on the south, Lyndale Avenue on the west and 12th Avenue on the east (See Figure 8). This area is being drained by eight storm structures with areas of 3 to 300 acres (Hickok, 1986)(See Figures 8 and 9). One structure in the southwest accounts for over 50% of the total drainage of the watershed (MPRB, 1994). Interstate 35W and Highway 62 contributes approximately 84 acres of watershed to the drainage or 11% of the total watershed (I-35W FEIS,1995). There is one outlet to the wetland, as previously mentioned, at the north east corner of the wetland. This weir was changed in 1991 to an elevation of 112.2 to re-establish emergent aquatic macrophytes for the restoration of a wildlife habitat (Brokberg, 1994). The outlet structure is used as the observation platform.

H. Surveys

In the more recent past, significantly more studies and surveys have been completed for Diamond Lake. The Minnesota Department of Natural Resources, Minneapolis Park and Recreation Board, Minnesota Pollution Control Agency and Minnehaha Creek Watershed District have all completed many water quality tests, lake surveys, and vegetation surveys. There are many factors that determine water quality. However, there are three measurements that may be the best indicators of the health of the water body:

- **Secchi Disk** - This black and white disk that is lowered into the water until it is no longer visible is one of the best parameters for determining trophic status (MPCA, 1996). This measurement is easy to take and cost efficient.
- **Phosphorus (P)** - Increased loading of phosphorus is often blamed for eutrophication (Brooks etal, 1991). Phosphorus enters a system by either attaching to soil, in the form of organic matter, (such as leaves and grass from streets), excess fertilization, or as a soluble form dissolved in water.
- **Chlorophyll-a** - Provides an estimation on the abundance of algae in the water.

Table 2: Summary of Water Quality Tests

Study	Secchi (meters)	P (mg/L)	Chlorophyll (ug/L)[1]	Number of Samples	TSI
DNR, 1953	1.37	.153	-	1	-
E. Hickock, 1980	.5	.32	171		-
E. Hickock, 1983	.5	.17	10		-
DNR, 1993	1.21	-	-		-
MPCA, 1991-1996	.8	.319	29		71
MPRB, 1996	0.7	.105	8.9		65
MCWD, 1996	1.02	.147	24		65.8
MCWD, 1997	1.01	.137	30		66.3

In general, the conclusion about Diamond Lakes' water quality has remained the same over this time frame. It's not great, but it's not bad either. The statistically valid data base indicates that the phosphorus levels indicate a eutrophic state, at that time (Hickok, 1986). This is a common trophic status for wetlands. MCWD lists Diamond Lake in the middle of its' descending order of water quality (Wenck, 1997). Hickock concluded the phosphorus loading is less then the urban watershed average. The Final Environmental Impact Statement for proposed changes to I-35W reports that the heavy metal levels are well below MPCA standards. However, the FEIS also shows that Diamond Lake receives more loading of phosphorus and has higher levels of phosphorus than all but one of the study lakes. This contradiction may be explained by the size of the watershed relative to the size of the basin. The wetland's recreational use is limited to primarily providing wildlife habitat and there is little need to initiate any formal restoration. (DNR, 1953) However, to protect the wetland for the future, steps to stewardship are recommended.

[1] Ug = micrograms = one millionth of a gram

Vegetation surveys conducted by the MPRB have been conducted according to provisions of the 1991 DNR permit to reconstruct the weir on the NE corner of the wetland. The reconstruction of the weir would serve several purposes. First, the weir would allow for the drawdown (draining) of the wetland to re-establish native vegetation and kill off nuisance plants. Re-establishment of native vegetation would provide better habitat for wildlife. Second, the weir would allow for control of the water level during times of excessive input to the basin. These surveys have been and will be conducted every two years and report the type, amount, and location (See Figure 10) of vegetation that occurs in the wetland. For instance, a survey conducted in 1993 by the MPRB revealed these species and their acreage:

Table 3: List of Plant Species and Their Acreage

Species	*Scientific Name*	Acreage
White water lily	*Nymphaea odorata*	16.20
Narrow-leaved Cattail	*Typha augustifolia*	5.55
Hardstem Bulrush	*Scirpus acutus*	0.32
Purple Loosestrife	*Lythrum salicaria*	0.13
Broad-leaved Arrowhead	*Sagittaria latifoilia*	0.22
Mixed Submerged Vegetation		26.21
Absent Vegetation		7.29
Diamond Lake Total		55.92

Mixed submerged vegetation consists of such species as Coontail, Duckweed, Elodea, and Potamogeton (Brockberg, 1994). This survey is comparable to the list of species collected in the 1953 DNR lake survey. Species noted at that time were:

- Bulrush
- Arrowhead
- White water lily
- Coontail
- Burreed
- Bushy pondweed
- Duckweed

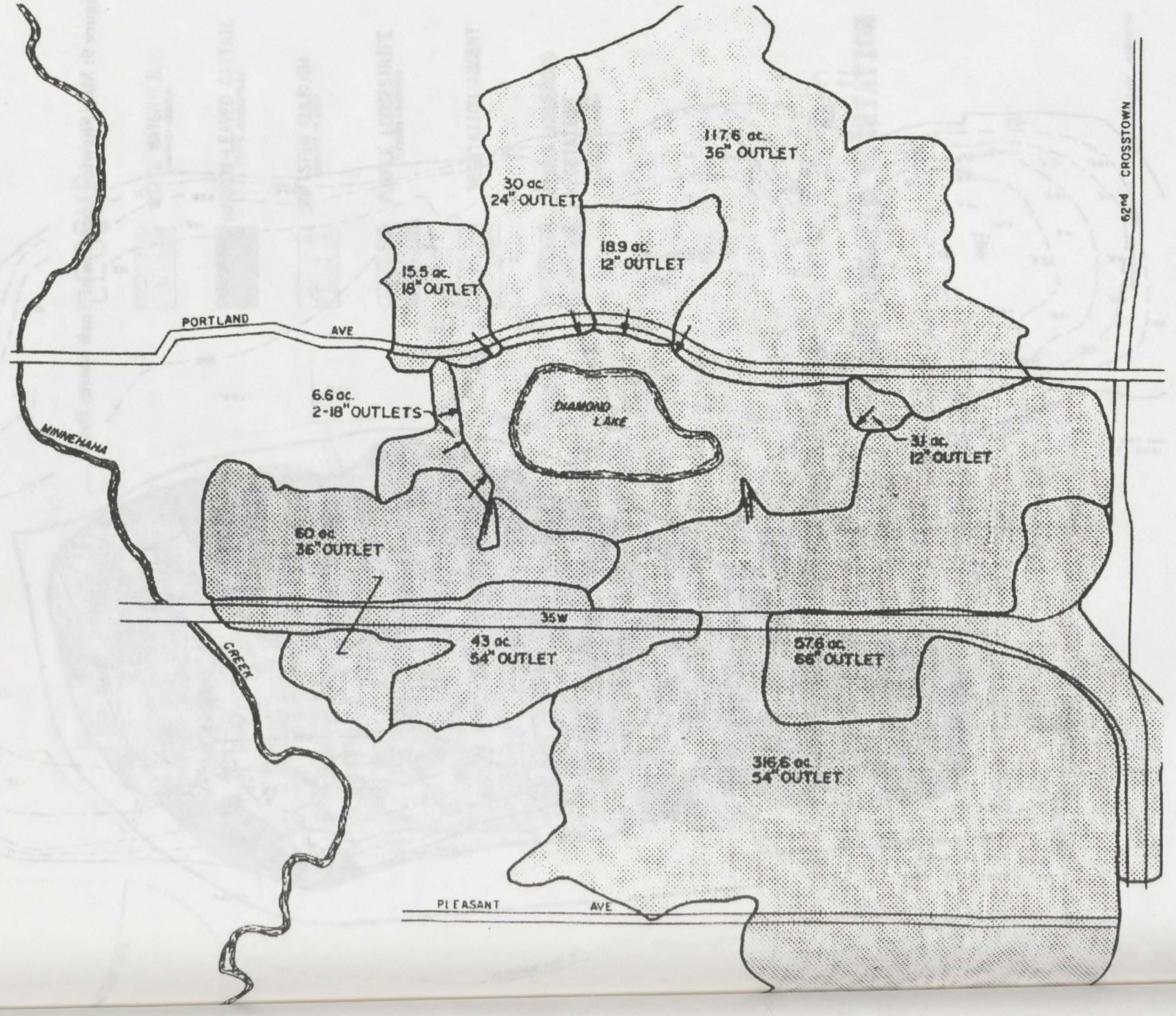


Figure 8: Map Showing Watershed Area of Each Storm Drain

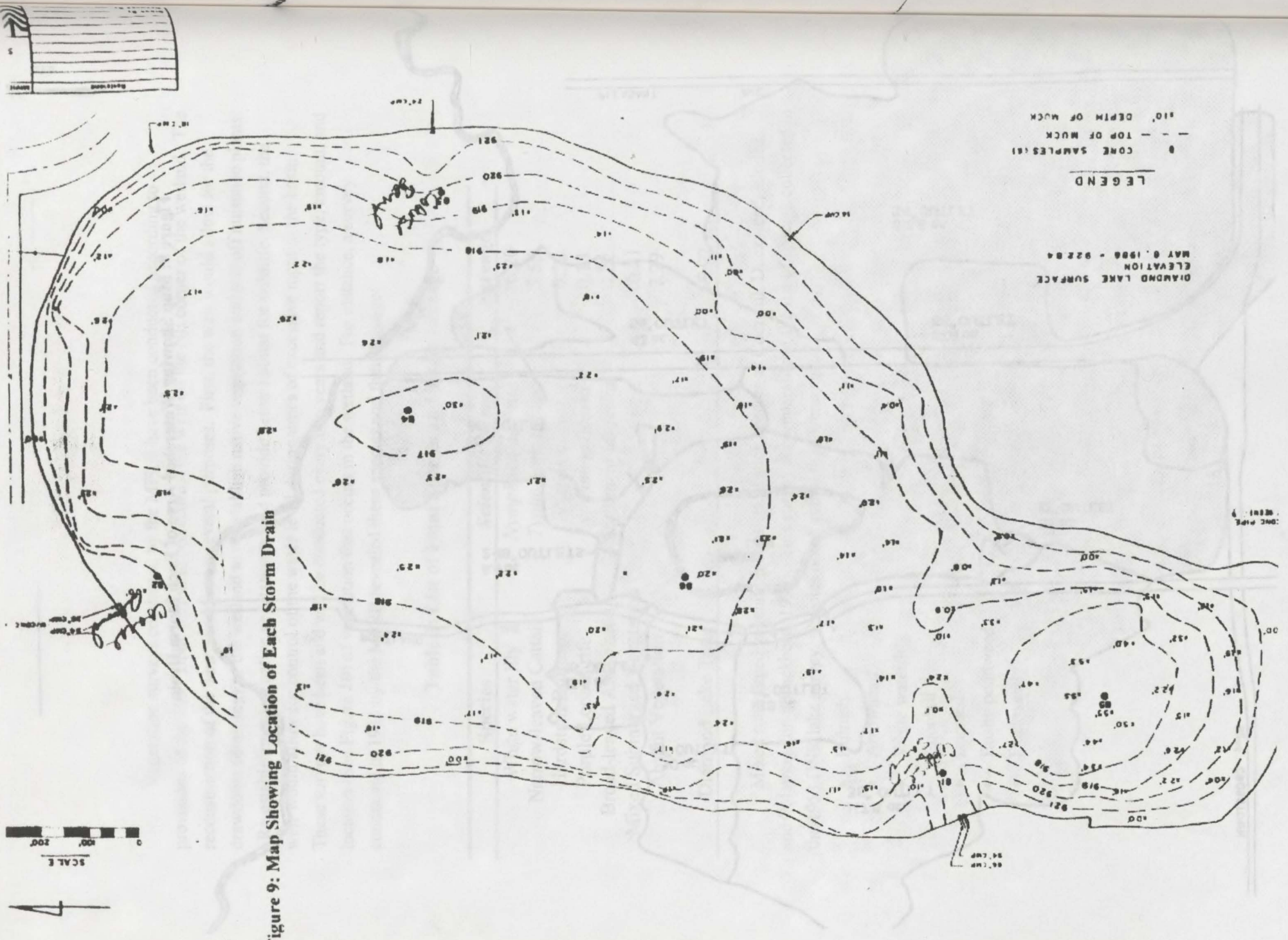
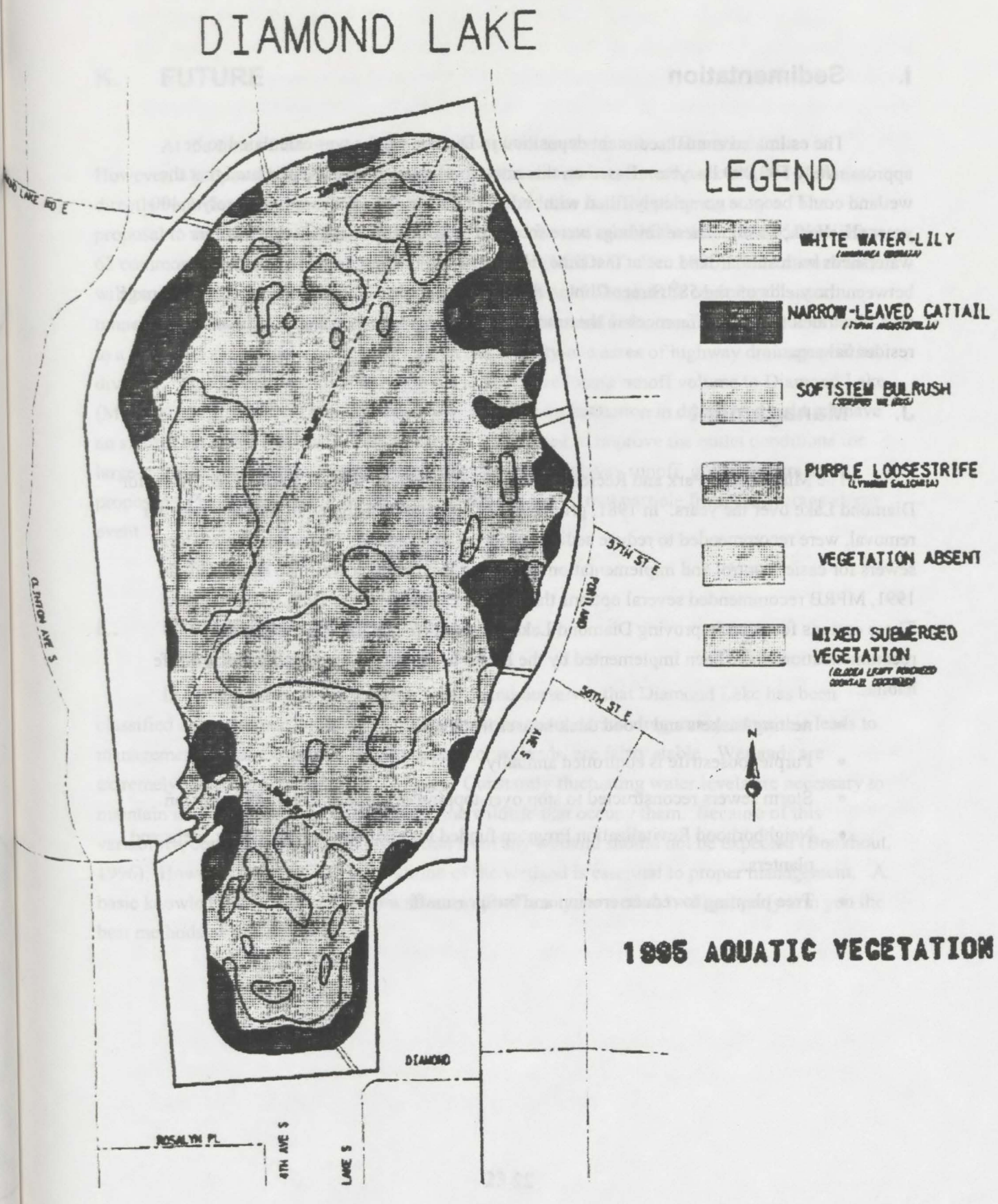


Figure 9: Map Showing Location of Each Storm Drain

Figure 10: Map of Vegetation Locations



I. Sedimentation

The estimated annual sediment deposition in Diamond Lake was calculated to be approximately 590,000 lbs/year. Based on this rate of sedimentation, it is estimated that the wetland could become completely filled with sediment over a period of approximately 1,400 years (Hickock, 1986). These findings were found to be generally less than that of other watersheds with similar land use at that time (Hickok, 1986). Nonetheless, a comparison between the yields of the 58th Street-Clinton drainage area and the Diamond Lake Road drainage area illustrated the vast differences in the amounts of loading from I-35W and industrial uses to residential areas.

J. Management

The Minneapolis Park and Recreation Board has produced several management plans for Diamond Lake over the years. In 1981, grit chambers, structures designed to trap sediment for removal, were recommended to reduce sedimentation of the wetland. Consolidation of storm sewers for easier control and implementation of another grit chamber was also suggested. In 1991, MPRB recommended several options that were mentioned by the 1986 Hickok study. These options focus on improving Diamond Lake as a wildlife habitat. The following recommendations have been implemented by the Board to improve water quality and wildlife habitat:

- nesting baskets and wood duck houses installed
- Purple loosestrife is controlled annually
- Storm sewers reconstructed to stop over-topping of curbs and shoreline erosion
- Neighborhood Revitalization Program funded installation of trails, docks, steps and planters.
- Tree planting to reduce erosion and buffer runoff.

K. FUTURE

At the time of this report there were few plans for the future of Diamond Lake. However, a proposal by the Department of Transportation to renovate the section of I-35W that directly contributes to the watershed area of Diamond Lake is in the planning stages. The proposal to add an High Occupancy Vehicle (HOV) lane and rebuild the Interstate 35W/Highway 62 commons area, will add more area to the watershed (MNDOT, Dec.1996). Increased runoff will be present in the areas that currently drain to Diamond Lake and the Minneapolis storm tunnel. To reduce the amount of runoff that flows to Diamond Lake, much of it will be diverted to a proposed storm water pond near Legion Lake. Fifty-one acres of highway drainage will be diverted. This diversion should have the net impact of reducing runoff volume to Diamond Lake (MNDOT, Sept. 1996). The report has concluded that the reduction in drainage should not have an significant effect on water levels and that it is expected to improve the outlet conditions for large storm events. To improve the water quality of the highway runoff, grit chambers are proposed. The chambers will be designed to remove the 0.1mm particle from the average storm event.

L. Recommendations

Due to its name, is often difficult to remind ourselves that Diamond Lake has been classified as a wetland. On account of this common misunderstanding, many times this leads to management mistakes. Lakes, in comparison to wetlands, are fairly stable. Wetlands are extremely varied and dynamic within years. Constantly fluctuating water levels are necessary to maintain desirable plant communities and the wildlife that occupy them. Because of this variability, consistent maximum production from any wetland should not be expected (Bookhout, 1996). However, monitoring the condition of the wetland is essential to proper management. A basic knowledge of the ecologic communities specific to your wetland will properly arm you the best methods of preservation.

Good stewardship by the individual, whether a homeowner with property on the wetland or a resident of the watershed, can do much to restore and maintain the health and future of the wetland. This process begins by finding the proper information to make sound management decisions. Each watershed is unique in its qualities and concerns. There is no other wetland or body of water specifically like this one. For Diamond Lake, controlling the sediment and controlling the input of nutrients are the most critical management practices that need to be addressed. Therefore, the Best Management Practices (BMP) will vary.

- **Involvement** - The best management practice a resident can do is get involved with other residents with the same concern. Collective efforts yield the greatest results.
- **Education** - As mentioned earlier, each watershed is unique. Find out what is unique about your water body and why it is that way. This will lead you to determine the best management policy.
- **BMPs** -
    - ⇒ **Preserve Natural Vegetation** - This policy filters sediments and nutrients. The best filter strips, areas adjacent to shores of water bodies, are mature woodlands with a minimum width of 50 feet.
    - ⇒ **Minimize Use of Pesticides and Fertilizers** - Excess nutrients and chemicals simply wash away. Obtain a soil test to determine the correct amount of fertilizer.
    - ⇒ **Erosion and Sediment** - Eroded soil and plant material contain nutrients that promote excess phosphorus input. Use mulch on exposed seed beds, landscape lawn to reduce slope, turn roof gutters away from hard surfaces, grit chambers can be installed to catch sediment before it enters the basin.

Other management practices may include residents monitoring the health of the wetland themselves. There are several programs available throughout the state, such as the Citizen Lake Monitoring Program, administered by the Minnesota Pollution Control Agency or the MPRB in Minneapolis. Each volunteer is provided with a Secchi disc and instructions for use for a small fee. Readings are taken each week from June 15 to September 15 and reported in an annual report. This program helps residents get involved personally with the wetland in an easy, cost-effective, and integral way.

M. Appendix A

This information was supplied by the Minnesota Department of Natural Resources Circular 39 "Wetland Types and Definitions."

Wetlands become protected when they fall into these categories:

- types 3, 4, and 5
- have not been designated as "protected waters"
- are 10 acres in size in undeveloped areas or 2 ½ or more acres in established areas.

The boundaries of protected wetlands is defined by the "ordinary high water mark" (OHWM). This is the elevation of the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally, it is the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. Any work done below the OHWM requires a permit from the DNR.

The Minnesota Department of Natural Resources (DNR) Circular 39 "Wetland Types and Definitions" was used in this report because the State of Minnesota has based it's program of wetland protection on this system. However, there are many classifications systems available.

According to the Minnesota DNR Circular 39, "Wetland Types and Definitions," Diamond Lake is classified as a Type 5 wetland. This means that it is an "Inland open fresh water. Shallow ponds and reservoirs are included in this type. Water is usually less than 10' deep and fringed by a border of emergent vegetation."

- **Floodwater Storage and Retention.** Wetlands can reduce flooding by slowing down the force of floodwaters and by providing temporary storage of large amounts of storm or snow melt water, thus reducing damages to roads, bridges, crops, etc..

- **Nutrient Assimilation.** Wetland plants absorb nutrient during their growth and development. This removal means cleaner water leaving the wetland.

- **Sediment Entrapment.** Wetlands can slow the flow of water moving through them. This allows sediments and associated nutrients time to settle out before the water is released to other wetlands, lakes, or streams.

- **Groundwater Recharge.** Some wetlands serve as a source of ground water recharge by collecting and retaining Surface waters that would otherwise end up in distant lakes or rivers, helping assure long-term supplies of quality ground water.

- **Aesthetics and Recreation.** Wetlands are often beautiful areas to observe unique plant and animal species. They are an amenity to residential and commercial development in urban environments. Hunters and fishermen also frequent wetland areas.

- **Erosion Control.** Wetland vegetation can reduce erosion along water body and stream banks by reducing forces associated with wave action.

- **Wildlife and Fish Habitat.** Many species of wildlife spend all or certain seasons of the year on wetland habitat for breeding, brood nesting, feeding or cover purposes. Many species of fish utilize habitats for egg laying, food, or protection.

- **Education.** Wetlands provide an outdoor classroom for learning.

N. Appendix B

Wildlife and habitat as recorded by Marvin Borell, during 1963 and 1980:

NATURAL SCIENCE IN OUR OWN BACK YARDS

Check list of species--how many have you and your child seen?

Natural science is a hobby for both mother and father to enjoy with sons and daughters at any age. In addition to providing a useful background for school and college science classes, it offers pleasant, wholesome recreation and fuller appreciation of the wonders of life.

The Windom-Diamond Lake area offers an unusually bountiful outdoor laboratory to bring our children many of the advantages of country life while living in the city. Probably no other city is so richly endowed to encourage young people in the study of the natural sciences. Perhaps, in your own home is a future Burbank, Koch, Darwin, Mayo or Audubon needing a bit of encouragement.

Listed below is a fairly accurate check sheet of living specimens in this area. We hope you will find these lists challenging references for making back yard field trips with your children.

ZOOLOGY - THE SCIENCE OF ANIMAL LIFE

MAMMALS (within Windom-Diamond Lake area):

grey squirrel	pocket gopher	muskrat	mole
cottontail rabbit	striped gopher	chipmunk	bat

MAMMALS (within 20 miles of this area):

deer	red fox	fox squirrel	weasel
skunk	grey fox	red squirrel	shrew
mink	ground hog	meadow mouse	

REPTILES AND AMPHIBIANS (in Windom-Diamond Lake area):

painted turtle	salamander	toad
mud turtle	garter snake	frog

FISH, WATER AND SOIL CREATURES (in Windom-Diamond Lake area):

*minnows	*carp	snail	slug
*sunfish	*bass	leech	earthworms
*bullheads	*croppy	crayfish	protozoa

*Freeze out occasionally but return again.

MARVIN C. BORELL

ORNITHOLOGY---THE SCIENCE OF BIRD LIFE

WATER AND SHORE BIRDS (42 species are seen within the Windom-Diamond Lake area. Of these, the 18 with asterisk* also nest here.)

*mallard duck	egret	canvas back	least sandpiper
*blue-wing teal	green heron	blue bill	red-backed sandpiper
*ruddy duck	night heron	golden eye	solitary sandpiper
*pied billed grebe	gadwall duck	buffle head	herring gull
*Forster's tern	baldpate duck	~~coot~~ coot	greater yellow-legs
*black tern	pintail duck	black duck	lesser yellow-legs
*bittern	gr. wing teal	hooded merganser	Wilson's snipe
*sandpiper	shoveler duck	American merganser	common tern
*killdeer	red head duck	red-breasted merganser	plover
cormorant	ring-neck duck	least bittern	
blue heron	*wood duck	dowicher	

WOODLAND AND MEADOW BIRDS (56 species are seen within the Windom-Diamond Lake area. Of these, the 18 with asterisk* also nest here.)

*ring-neck pheasant	*oriole	horned lark	song sparrow
*mourning dove	*English sparrow	tree swallow	swamp sparrow
*chimney swift	*red-wing blackbird	bank swallow	vesper sparrow
*flicker	*bronze grackle	brown creeper	Savannah sparrow
*red-head woodpecker	sparrow hawk	blue bird	goldfinch
*barn swallow	yellow-bill cuckoo	cedar waxwing	cow bird
*purple martin	screech owl	yellow-throat vireo	meadow lark
*blue jay	night hawk	warbling vireo	junco
*house wren	humming bird	Tennessee warbler	crow
*marsh wren	kingfisher	Myrtle warbler	chickadee
*cat bird	hairy woodpecker	yellow warbler	nuthatch
*brown thrasher	downy woodpecker	snow bunting	shrike
*starling	Brewer's blackbird	yellow throat warbler	cardinal
*robin	flycatcher	scarlet tanager	phoebe

BOTANY - THE SCIENCE OF PLANT LIFE

WILD FLOWERS AND PLANTS (Over 44 species grow in the Windom-Diamond Lake area. Listed below are 20 of the more common varieties.)

morning glory	violet	butter-and-eggs	white waterlily
clover	vetch	mullein	yellow waterlily
columbine	wood sorrel	dandelion	arrowhead
milkweed	black-eyed Susan	sticktight	Queen Anne's lace
wild aster	touch-me-not	yarrow	goldenrod

TREES, SHRUBS AND VINES (At least 40 different varieties may be found in the Windom-Diamond Lake area.)

*white pine	*red cedar	bur oak	locust
*magho pine	*arborvitae	*butternut	*apple
*Austrian pine	willow	*mountain ash	*plum
*Scotch pine	elm	*red maple	sumac
*Norway pine	birch	*sugar maple	hawthorne
*black spruce	alder	silver maple	poplar
*blue spruce	aspen	boxelder	wild grape
*white fir	cottonwood	white ash	black raspberry
*balsam fir	white oak	mountain ash	Virginia creeper
*juniper	red oak	*catalpa	*Boston ivy

* in neighborhood yards

ENTIMOLOGY - THE SCIENCE OF INSECT LIFE

BUTTERFLIES, MOTHS AND INSECTS (Over 66 varieties may be found in the Windom-Diamond Lake area. Listed below are 20 of the most common species. Many have more than one variety.)

bees	cicada	aphid	June bug
ants	walking stick	water bug	click beetle
wasps	katydid	dragon fly	fire fly
butterflies	cricket	house fly	mosquitoe
moths	grasshopper	May fly	lady bug

ROCKS, MINERALS AND MARINE LIFE

This hobby can be started on a local basis but soon calls for contact with widely different geographical areas. The Windom-Diamond Lake area offers a variety of sand, clay, loam and silt soil samples, fresh water shells, and certain types of pebbles. Our display shows rock, mineral and shell samples from various sections of the nation.

THESE VARIETIES ARE ALL IN THE YARD AREA - (See how many you can identify - see how many additional varieties you can add to the lists.)

PLANTS

___ columbine
___ milkweed
___ wild strawberry (also tame)
___ nettle
___ figwart
___ blue violet
___ yellow violet
___ vetch (wild sweet pea)
___ lily (tame)
___ wood sorrel
___ butter & eggs
___ asparagus
___ dandelion
___ mullein
___ black raspberry
___ Solomon Seal (small example)
___ Wild Geranium (water leaf)
___ goldenrod
___ fern
___ spiderwort
___ wild ginger
___ catnip
___ Canada May Flower
___ trillium
___ bellwort
___ wintergreen (small planting)
___ Chickweed
___ sunflower
___ plantain

OTHER

___ wild cucumber
___ moss

TREES

___ white pine
___ mugho pine
___ Scotch pine
___ Austrian pine
___ Norway pine
___ Jack pine
___ bristle-cone pine
___ green spruce
___ balsom fir
___ juniper
___ red cedar
___ white cedar
___ yew
___ hemlock
___ Black Hills spruce (white)
___ butternut
___ birch
___ maple (tiny)
___ willow
___ oak (3 kinds)
___ elm
___ ash
___ elderberry
___ boxelder
___ mulberry

OTHER

___ ivy

Following are the birds you'll most likely see:

___ English sparrow
___ Robin
___ Grackle
___ Brewer's or bronze blackbird
___ Red wing blackbird
___ Catbird
___ Brown thrasher
___ Purple martin
___ Mourning dove
___ Cardinal
___ Starling
___ Mallard
___ Wood duck
___ Blue-winged teal
___ Common tern
___ Black tern
___ Coot
___ Pheasant
___ Tree swallow
___ Goldfinch
___ Sandpiper
___ Flicker
___ chickadee
___
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ADD OTHER VARIETIES HERE

___ Rabbit
___ Toad
___ Turtle (painted)
___ Turtle (snapping)
___ Muskrats
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May 28, 1963

MARION C. PARISH

Look For These And Other Items Around Diamond Lake

BIRDS

- Pied-billed Grebe
- Great Blue Heron
- Black Crowned Night Heron
- Green Heron
- Canada Goose
- Mallard
- Blue-winged Teal
- Wood Duck
- Redhead Duck
- Ruddy Duck
- Ring-necked Pheasant
- Sora Rail
- American Coot
- Killdeer
- Spotted Sandpiper
- Forester's Tern
- Black Tern
- Mourning Dove
- Screech Owl
- Night Hawk
- Chimney Swift
- Flicker
- Downy Woodpecker
- Tree Swallow
- Barn Swallow
- Purple Martin
- Blue Jay
- Chickadee
- Nuthatch
- House Wren
- Catbird
- Brown Thrasher
- Robin
- Starling
- Yellowthroat
- House Sparrow
- Redwinged Blackbird
- Yellow-headed Blackbird
- Brewer's Blackbird
- Nothern Oriole
- Common Grackle
- Cardinal
- Chipping Sparrow
- Song Sparrow
- Swamp Sparrow
- Hummingbird

Plus at least 75 additional species that are seen in winter and in the migration periods.

EVERGREENS

- White Pine
- Red Pine (Norway)
- Jack Pine
- Scotch Pine
- Austrian Pine
- White Cedar
- Red Cedar
- Juniper
- Balsam Fir
- White Spruce
- Black Spruce
- Blue Spruce
- Yew

DECIDUOUS TREES

- Red Maple (hard)
- Silver Maple (soft)
- Sugar Maple
- Boxelder
- Birch (White & Gray)
- Ash (White)
- Red Oak
- Black Oak
- White Oak
- Willow (Black)
- Willow (Weeping)
- Quaking Aspen
- Basswood
- Cottonwood
- Butternut
- Elm (American)
- Elm (Chinese)
- Mulberry
- Hackberry
- Choke Cherry
- Wild Plum
- Thorn Apple (Hawthorne)
- Mountain Ash

SHRUBS & VINES

- Sumac (smooth)
- Sumac (Staghorn)
- Dogwood (Red Osier)
- Elderberry
- Gooseberry
- Blackberry
- Grape
- Woodbine
- Honeysuckle
- High Bush Cranberry
- Wild Rose
- Glossy Buckthorn

WILD PLANTS

- Columbine
- Milkweed
- Jerusalem Artichoke
- Nettle
- Violet
- Wood Sorrel
- Dandelion
- Mullein
- Goldenrod
- Fern
- Wild Ginger
- Catnip
- Evening Primrose
- Curly Dock
- Burdock
- Purple Loostrife
- Bitter Nightshade
- Motherwort
- Water Lily (Yellow)
- Water Lily (White)
- Arrowhead (Wapato)
- Touch-me-not (Jewel Weed)
- Wilder Aster
- Flea Bane
- Ox Eye Daisy
- Wood Sorrel
- Sheep Sorrel
- Goat's Beard
- Wild Geranium
- Phlox
- Vetch (Wild Sweet Pea)
- Butter and Eggs
- Yarrow
- Solomon's Seal
- False Solomon's Seal

GRASSES

- Red Clover
- White Clover
- Sedge
- Cattail
- Reed
- Duckweed
- Plantain
- June Grass

OTHER PLANTS

- Mosses
- Lichens
- Shelf Fungus
- Mushrooms

ANIMALS (or positive tracks)

- Chipmunk
- Gray Squirrel
- Rabbit
- Crayfish
- Minnow
- Snail
- Toad (American)
- Turtle (Painted)
- MUSKRATS
- RED SQUIRRELS

(2) MARVIN C. BORELL, MINNEAPOLIS, MN.
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